

Correlation of Fine Needle Aspiration Cytology with Histopathology in Palpable Breast LumpsLakshmi Narayanan M^{1*}, Kannan K², John Veslin T³¹Associate Professor, Department of General Surgery, Theni Medical College, Theni, Tamilnadu, India²Associate Professor, Department of General Surgery, Govt. Theni Medical College Hospital, Theni, Tamilnadu, India²Assistant Professor, Department of General Surgery, Govt. Theni Medical College, Theni, Tamilnadu, India

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Abstract:

The spectrum of breast diseases extends from benign conditions like fibroadenoma to highly malignant conditions like mastitis carcinomatosa. The vast spectrum of breast diseases poses a great challenge to the surgeon while evaluating the patient pre-operatively. Appropriate management of breast disease needs reliable preoperative tissue diagnosis to provide a clear picture of the illness to the patient as well as to plan the modalities of treatment. Advent of FNAC has provided a reliable pre-operative tissue diagnostic tool. FNAC is a direct first line approach to the evaluation of palpable masses. It does not require elaborate tissue processing and is therefore least expensive method of diagnosis (layfield et al.1993).The application of FNAC for the diagnosis of palpable breast masses was first introduced by Martin and Ellis in 1930 and since then has been established as an important tool in the evaluation of breast lesions.

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Introduction

A palpable breast lump is a common clinical presentation of patients with breast diseases. Current practice utilizes radiological imaging in combination with needle biopsy in reducing the need for unnecessary surgical excision of benign breast lesions. A preoperative diagnosis offers several advantages such as; relieving the patient's anxiety and saves time, a definitive treatment plan can be prepared and discussed with the patient in advance, diagnosed cases of breast cancer can be staged, many benign conditions can be diagnosed and surgery avoided.

The pioneering work at the Karolinska institute in Stockholm by Torsten Lowhagen and his colleagues, in the 60s and 70s helped to popularize a new minimally invasive technique of diagnosis known as Fine-Needle Aspiration Cytology (FNAC). Fine-Needle Aspiration Cytology (FNAC) is a simple, cost effective, easily reproducible, accurate pre-operative test performed on all cases with both palpable and on non-palpable breast lumps using imaging techniques like mammography and ultrasonography.

Detection of minimal residual disease for the purpose of planning a therapeutic protocol and eventual follow-up can be done by FNAC. Thus,

Triple test is an important preoperative assessment procedure carried out along with clinical correlation and imaging studies. Inability to differentiate in situ from invasive carcinoma is the limitation of FNAC. Tissue core needle biopsy has overtaken FNAC in the diagnosis of breast malignancies in palpable and nonpalpable lesions, as grading of tumors and an ER and PR receptor status can easily be performed on a tissue core biopsy as compared to an FNAC which helps the treating surgeon in deciding the need for chemotherapy as a first line of treatment for breast carcinoma. Phyllodes tumor, spindle cell lesions, mucinous lesions, fibroepithelial lesions with cellular stroma, radial scar, atypical ductal hyperplasia and lobular neoplasm show diagnostic difficulty even with core needle biopsy require excision of the lump.

The overall accuracy of FNAC in diagnosis of breast lesions is reported to be about 97.40%. The diagnostic sensitivity, specificity, and predictive value of a positive result of FNAC for diagnosing breast lesions are 93.80%, 98.21%, and 92.70% respectively.

Reports have shown a sensitivity of 94.5%, specificity of 98%, diagnostic accuracy of 97%,

positive predictive value of 95.8%, and negative predictive value of 97.4% in malignancy. In this study the false positive and false negative rates were 1.3% and 1.8% respectively. In literature, false negatives range from 7.5% to 21.9% and even in biopsies diagnosed by frozen section shows 4% false negative rate.

Materials and Methods

Source of Data

Observational method of primary source of information on FNAC and histopathological samples of palpable breast lumps registered subjects admitted in department of general surgery, at Govt Theni Medical College Hospital, Theni during September 2021 to August 2022. Secondary source of information from published articles, journal books and related websites are used in planning, developing synopsis, and during dissertation as a supporting document.

Methods of Collection of Data

All patients referred to department of general surgery with palpable breast lumps fine needle aspiration will be done in our present prospective study in Govt Theni Medical College Hospital, Theni. The study will be conducted over a period of 12 months September 2021 to August 2022. A written consent will be taken before performing the FNAC and report recorded. Preoperative FNAC diagnosis is then compared with postoperative histopathological reports in cases which undergo surgical excision and thus its diagnostic accuracy will be determined.

Inclusion criteria

All females with clinically palpable breast lumps.

Exclusion criteria

1. Male sex
2. Ulcerative and recurrent growths
3. Clinically malignant breast mass

Study Design: Correlational Study

Study Period: September 2021 to August 2022.

Sample Design: Purposive Sampling Technique

Sample Size: A Sample size of 90 subjects with clinically palpable breast lumps will be included in the study.

Statistical Analysis: The data in this study will be assessed using, Descriptive Statistics, Chi-Square Test Cramer's V Test, Sensitivity, Specificity, NPV and PPV.

Ethical clearance

The study was reviewed by The Institutional Ethical Committee and clearance was given.

Data collection

In outpatient department a detailed history and thorough physical examination of the patient having palpable breast lump was carried out and entered in the proforma. The patient was informed about the procedure and informed consent was obtained from the patient before subjecting to fine needle aspiration cytology of the breast lump.

The standard procedure was followed, making use of a 10ml syringe bearing a 23-gauge needle (external diameter of 0.6mm). The mass was located clinically and fixed in position with free hand. The skin over the puncture site was sterilized with spirit or betadine. The needle was placed over the skin and its direction was determined before it was introduced in the mass in one swift motion. This minimized the discomfort to the patient. The patients were informed about the cytological diagnosis. If the lumps on the cytological examination were reported as malignant, then mastectomy or modified radical mastectomy was performed and the specimen sent for the histopathological confirmation of the diagnosis. In those cases, which were reported as suspicious of malignancy, they underwent intraoperative rapid haematoxylin and eosin staining for confirmation of malignancy before underwent modified radical mastectomy and histopathological confirmation. Accuracy of the needle tip in localizing the tumour in fine needle aspiration cytology was also studied by comparing the normal glandular aspirate with tumour cell aspirate. Since the fine needle aspiration was done for palpable tumour ultrasound guidance was not followed and repeat fine needle aspiration was carried out before open/excision biopsy if the pathologist reports the cytology slide as "inadequate".

Coding for FNAC Report

Diagnostic category Corresponding numerical code

- Inadequate/insufficient 1
- Benign 2
- Atypical/indeterminate 3
- Suspicious of malignancy 4
- Malignant 5

Sample size of Estimation

Using Estimation Technique with prevalence of palpable breast lumps of 6%⁶; Sample size can be calculated by,

$$S = Z^2 pq / d^2$$

Where,

S- Sample Size

Z- Constant (1.96)

p- Prevalence (6%)

q- (1-p)

d- Margin of error (5%)

A Sample size of 90 subjects with clinically palpable breast lumps will be included in the study.

Data collection

In outpatient department a detailed history and thorough physical examination of the patient having palpable breast lump was carried out and entered in the proforma. The patient was informed about the procedure and informed consent was ob-

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Results

Table 1: Age Distribution

Age	No. of Cases	Percentage
< 25	18	20.00
26 - 35	27	30.00
36 - 45	14	15.56
46 - 55	11	12.22
56 -65	15	16.67
> 65	5	5.56
Total	90	100.00
Mean	40.033	
SD	16.317	

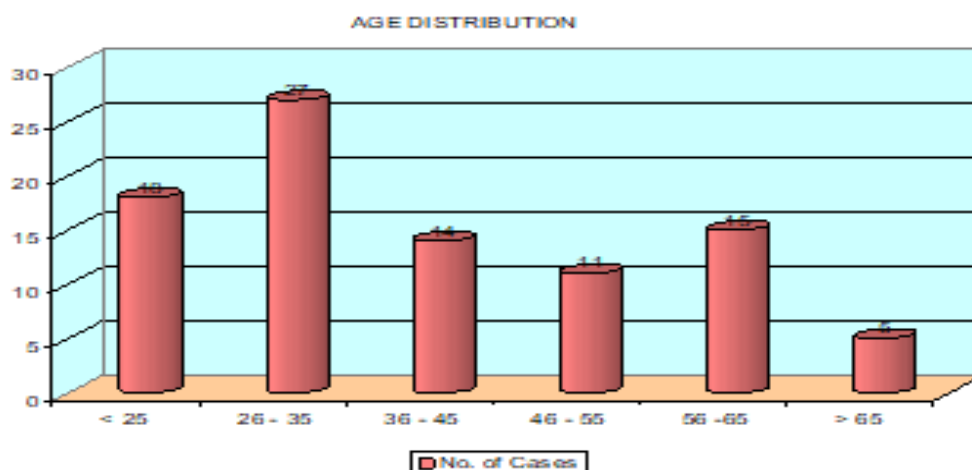


Figure 1: Age Distribution

Of 90 women studied, age incidence was ranged from 17 to 81 years (mean age 40.03 years, SD=16.32 years) and most common age group having breast lump was 26-35years.

Table 2: Age Vs Palpable Breast Lumps (Benign/Malignant)

Age	Benign	Percentage	Malignant	Percentage	Total	Percentage
< 25	17	18.89	1	1.11	18	20.00
26 - 35	25	27.78	2	2.22	27	30.00
36 - 45	11	12.22	3	3.33	14	15.56
46 - 55	0	0.00	11	12.22	11	12.22
56 -65	1	1.11	14	15.56	15	16.67
> 65	0	0.00	5	5.56	5	5.56
Total	54	60.00	36	40.00	90	100.00

The most common age group for benign lesions was between 26 to 35 years and for the malignant lesion was 56 to 65 years.

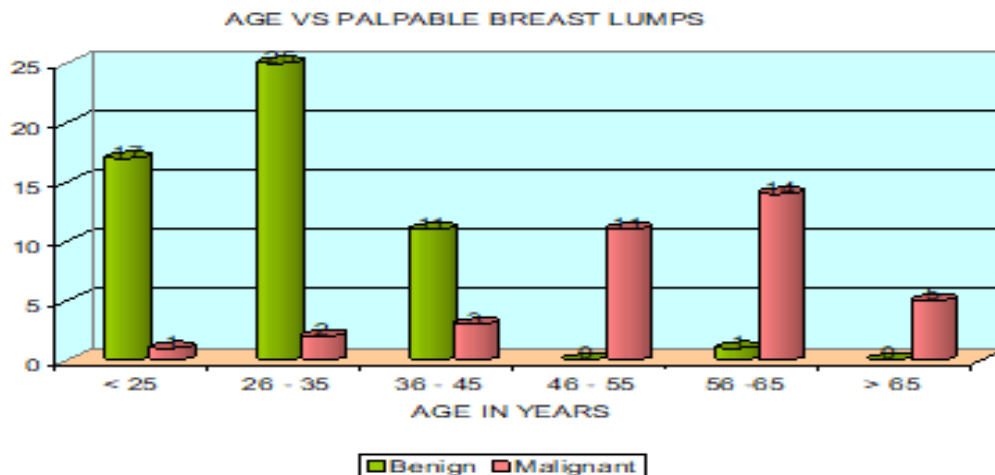


Figure 2: Age Vs Palpable Breast Lumps

Table 3: Affected Side of Breast Vs Palpable Breast Lumps (Benign/Malignant)

Affected Side of Breast	Benign	Percentage	Malignant	Percentage	Total	Percentage
Right	21	23.33	24	26.67	45	50.00
Left	31	34.44	12	13.33	43	47.78
Both	2	2.22	0	0.00	2	2.22
Total	54	60.00	36	40.00	90	100.00

Out of total 90 patients, 45 patients had lump in right breast, 43 had lump in left breast and 2 patients had lump in both side. Malignant lesions were found more common in the right breast as compared to left one in this study. The incidence of benign breast lesion was found more in left side of breast in our study. Two patients were having lumps in both the breasts, fine needle aspiration cytology as diagnosed as fibroadenoma later confirmed by histopathology.

AFFECTED SIDE OF BREAST VS PALPABLE BREAST LUMPS

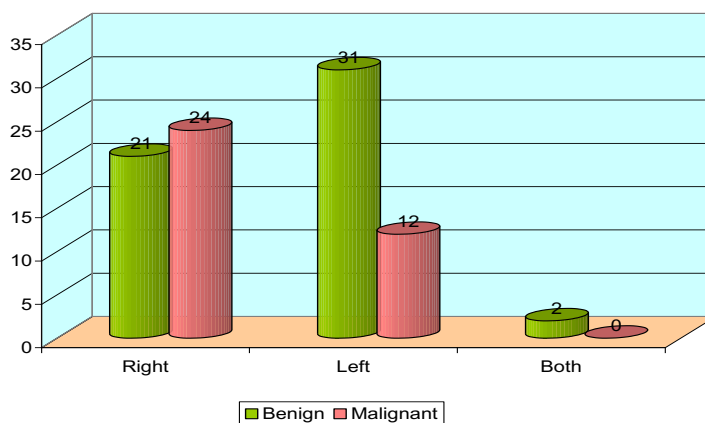


Figure 3: Affected Side of Breast Vs Palpable Breast Lumps

Table 4: Size of Lump Vs Palpable Breast Lumps (Benign/Malignant)

Size of Lump	Benign	Percentage	Malignant	Percentage	Total	Percentage
0 - 5	49	54.44	4	4.44	53	58.89
6 - 10	5	5.56	29	32.22	34	37.78
> 10	0	0.00	3	3.33	3	3.33
Total	54	60.00	36	40.00	90	100.00

The size of the breast lump ranged from 1.3 to 10.7 cms. The benign lesions ranged between 1.3 to 9.1 cms. Malignant lesions were ranged between 3.7 to 10.7cms.

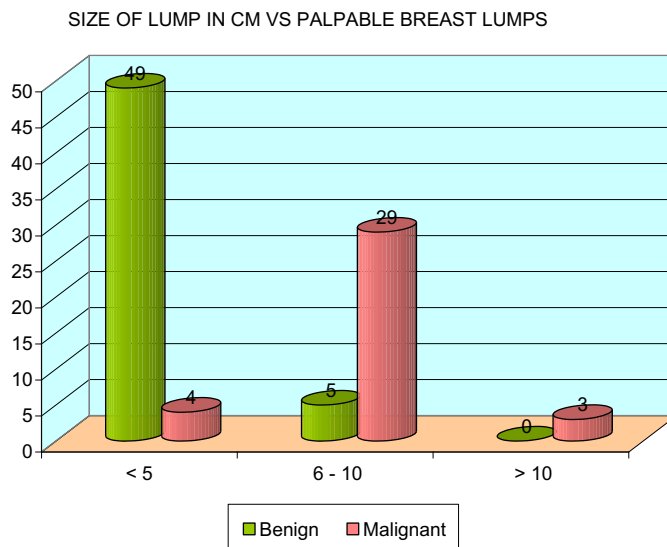


Figure 4: Size of Lump Vs Palpable Breast Lumps

Table 5: Quadrant of Breast Involvement Vs Palpable Breast Lumps (Benign/Malignant)

Quadrant of Breast Involvement	Benign	Percentage	Malignant	Percentage	Total	Percentage
U.O.Q	9	10.00	18	20.00	27	30.00
U.I.Q	7	7.78	4	4.44	11	12.22
Central	12	13.33	14	15.56	26	28.89
L.O.Q	9	10.00	0	0.00	9	10.00
L.I.Q	17	18.89	0	0.00	17	18.89
Total	54	60.00	36	40.00	90	100.00

It represents distribution of patients according to the quadrant of breast involvement, shows that 42(45%) cases out of 54(60%) total benign cases had breast lump in lower inner quadrant of breast. Malignant lump were found in upper and central quadrants, out of total 14 cases 26(29%) cases had breast lump in upper outer quadrant.

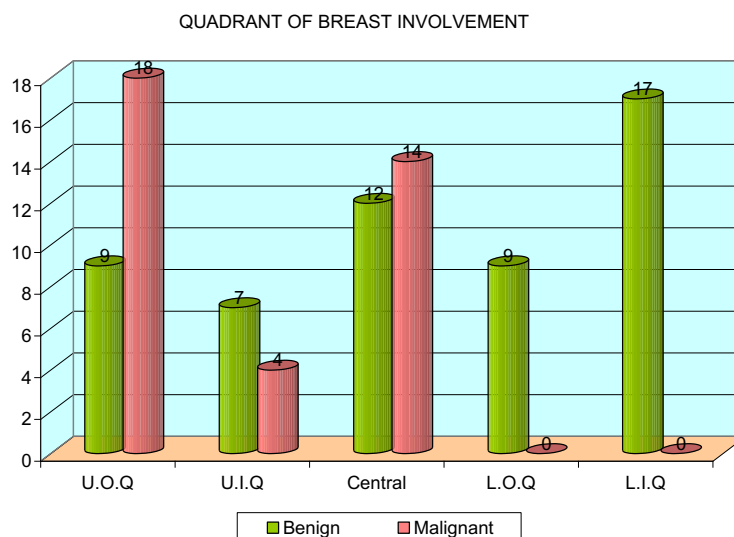


Figure 5: Quadrant of Breast Involvement

Table 6: Discharge from Nipple Vs Palpable Breast Lumps (Benign/Malignant)

Discharge from nipple	Benign	Percentage	Malignant	Percentage	Total	Percentage
Yes	5	5.56	27	30.00	32	35.56
No	49	54.44	9	10.00	58	64.44
Total	54	60.00	36	40.00	90	100.00

Out of 32 discharges from nipple cases, 27 are malignant and only 5 nipple discharge cases from benign.

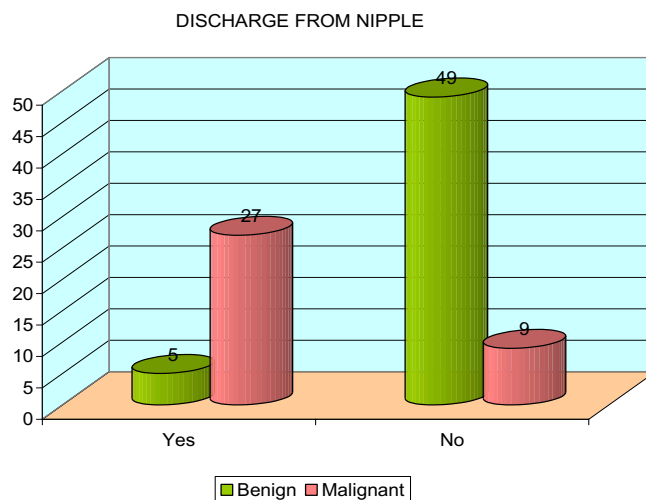


Figure 6: Discharge from Nipple

Table 7: Family History Vs Palpable Breast Lumps (Benign/Malignant)

Family history	Benign	Percentage	Malignant	Percentage	Total	Percentage
Yes	2	2.22	6	6.67	8	8.89
No	52	57.78	30	33.33	82	91.11
Total	54	60.00	36	40.00	90	100.00

Among 90 patients, 8 patients of breast lump were having family history of breast carcinoma in mother. All these 6 patients diagnosed as Infiltrating duct carcinoma by histopathological report.

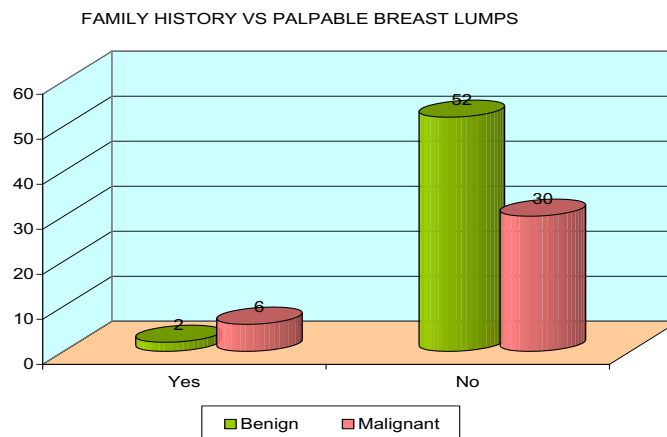


Figure 7: : Family History Vs Palpable Breast Lumps

Table 8: Diagnosis of Palpable Breast Lumps (Benign/Malignant) FNAC Vs HPE

Diagnosis	Benign	Malignant	Suspicious	Total
FNAC	58	31	1	90
HPE	54	36	0	90

Of the 58 cases of benign report by fine needle aspiration cytology, 54 were confirmed by histopathology. False negative were 4 cases. False positive was zero. Out of 36 malignant cases by HPE report but 31 cases are malignant in FNAC report.

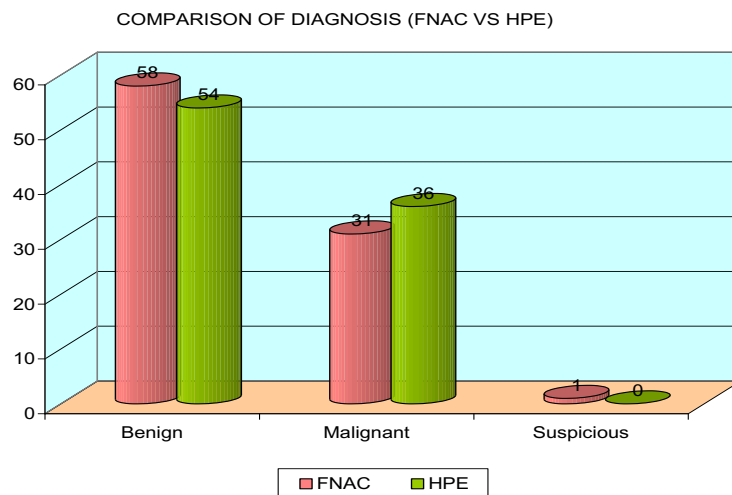


Figure 8: Comparison of diagnosis (FNAC Vs HPE)

Table 9: Diagnosis of Benign Cases

Diagnosis	Frequency	%
Fibro adenoma	41	45.56
Fibrocystic disease	10	11.11
Serous cystadenoma	1	1.11
Fatty degeneration	2	2.22
Total	54	60.00

Out of 54 benign cases, 41 were fibro adenoma, 10 cases were fibrocystic, 2 cases are fatty degeneration and one case is serous cystadenoma.

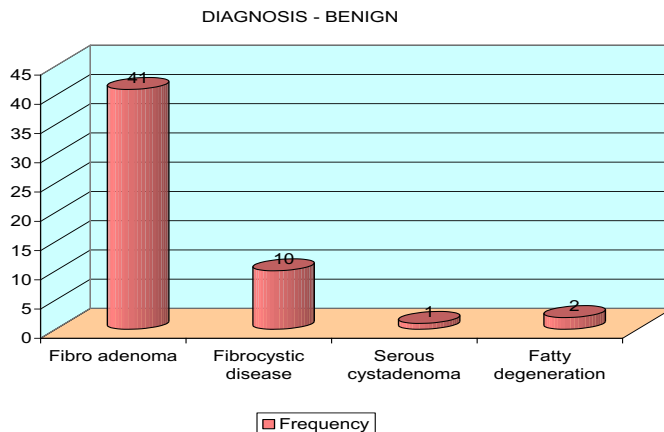


Figure 9: Diagnosis- Benign

Table 10: Diagnosis of Malignant Cases

Diagnosis	Frequency	%
Infiltrating duct carcinoma	26	28.89
Lobular carcinoma	7	7.78
Comedo carcinoma (noninfiltrating)	3	3.33
Total	36	40.00

Out of 36 malignant cases, 26 had infiltrating duct carcinoma, 7 cases were lobular carcinoma and 3 cases were comedo carcinoma.

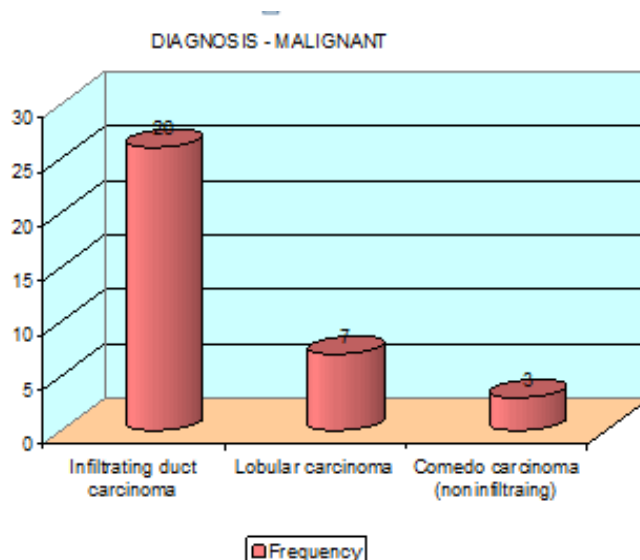


Figure 10: Diagnosis- Malignant

Table 11: FNAC Vs HPE Report

Test result (FNAC)	Disease (malignant)	Not diseased (benign)	Total
Positive	32 (a) (True positive)	4(b) (False positive)	36
Negative	0(c) (False negative)	54 (d) (True negative)	54
Total	32	58	90

Out of 36 positive cases, 32 were detected by FNAC and 4 were false positive. Out of 54 negative benign cases, all 54 are detected by FNAC no false negative cases.

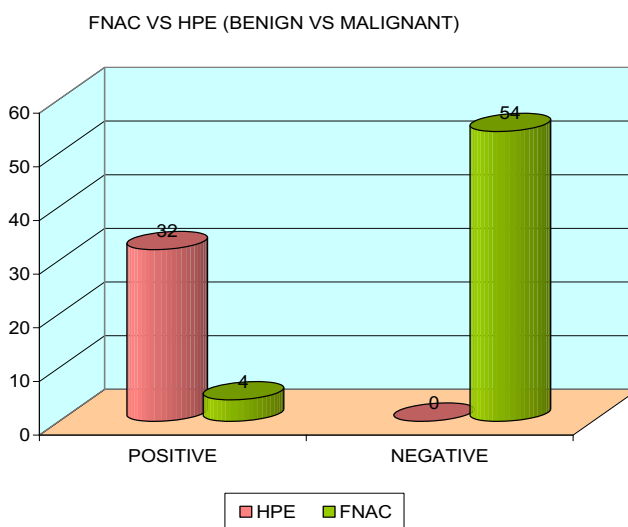


Figure 11: FNAC Vs HPE (Benign VS Malignant)

Table 12: FNAC Vs HPE Comparison - Sensitivity

Statistic	Value	95% CI
Sensitivity	100.00%	89.11% to 100.00%
Specificity	93.10%	83.27% to 98.09%
Positive Predictive Value	88.89%	75.65% to 95.37%
Negative Predictive Value	100.00%	
Accuracy	95.56%	89.01% to 98.78%

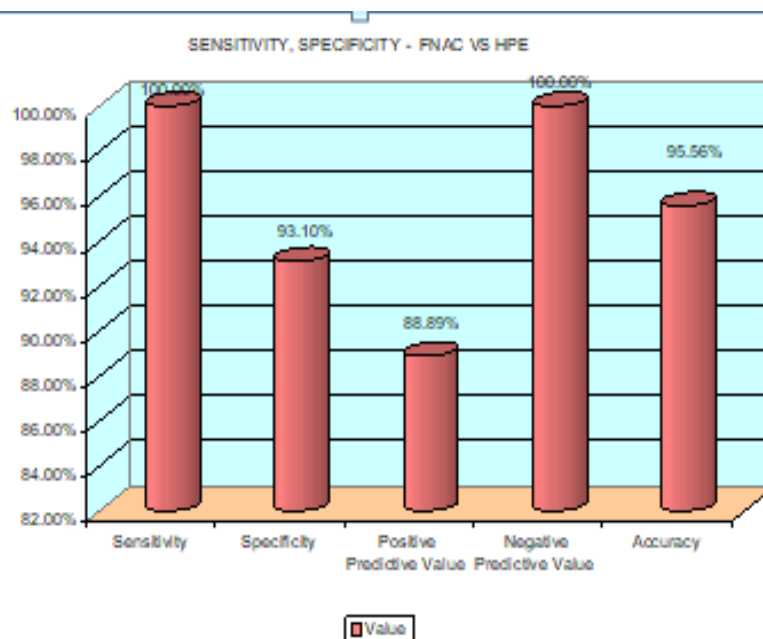


Figure 12: Sensitivity, Specificity FNAC VS HPE

Discussion

A Breast lump is a common complaint presenting in the surgical out-patient department of all major hospitals, with anxiety regarding a possible malignancy being extremely common. Accurate diagnosis of carcinoma has been a diagnostic dilemma since long time. A differential diagnosis of the benign, traumatic and malignant lesions is very essential in the early stages of the disease. It is extremely important that unnecessary surgeries or invasive treatment for benign diseases should be minimized, and malignant lesions are managed aggressively in the early stages. Breast is an important and common site where fine needle aspiration cytology is done. There is an increasing tendency to confirm the diagnosis of the breast carcinoma at first consultation by some form of needle biopsy technique. This allows better investigation and wiser preoperative discussion than was possible when excision biopsy and frozen section confirmed the clinical diagnosis.

The expansion of fine needle aspiration cytology in the primary diagnosis of carcinomas in the last 30 years has been enormous and highly successful. Its use in detecting the presence of cancers before surgery and as a guide to rational treatment has been well documented. Countries with most developed aspiration biopsy techniques are Sweden, Slovenia, United States of America and India. At Karolinska hospital (Stockholm, Sweden), fine needle aspiration cytologies average 11,000 annually and at the Institute of Oncology Ljubljana, Slovenia 10,000. In United States of America, the highest number is encountered at M. D. Anderson at Houston, Texas with 7,000 aspirates every year. At All India Insti-

tute of Medical Sciences (AIIMS) the annual volume of cytology specimens is more than 15,000 with fine needle aspiration cytologies comprising roughly half of the aspirations. Our present study was conducted on 90 female study subjects with a palpable breast lump each of whom underwent a fine needle aspiration cytology of the lump followed by excisional surgery either in the form of a lumpectomy or a definitive surgical procedure like a modified radical mastectomy, depending on the diagnosis at fine needle aspiration cytology. The fine needle aspiration cytology findings were then matched with the final histology report to see as to how accurate fine needle aspiration cytology was as compared to open biopsy i.e., to assess the cyto-histologic correlation. Out of 90 women selected for our study, the age ranged from 17 years to 70 years with an average of 40.03 years (SD 16.32 years) and most common age group having breast lump was 26-35 years. The age incidence for the benign lesions ranged from 20 years to 70 years with a mean age of 26.66 years (SD 8.54 years). The incidence for the malignant lesions ranged from 20 to 80 years with mean age being 54.4 years (SD 9.13 years). The most common age group for benign lesions was between 26 to 35 years and for the malignant lesion was 55 to 64 years. The study done by A. Khemka et al, the age range was 14 years to 61 years with overall mean age was 37.5 years, peak incidence for benign lesion in 2nd and 3rd decade of life respectively and malignant lesions above the age of 40 years and peak incidence was found in between 40-44 years. Similar studies done by Ghimiret al, Homesh et al, Alam et al and Tiwari et al showed similar age patterns. In our study, the right breast was involved in 45 study

subjects while the left breast was involved in 43 patients. Bilateral involvement was seen in only 2 patients. A.Khemka et al. in their study, showed left breast involvement in 28 study subjects while in the other 22 study subjects the right breast was involved. No surgical importance can be attached to this observation since patient selection was in no way dictated by involvement of any of the particular breast. The size of the breast lump ranged from 1.3 to 10.7 cms in our study. The benign lesions ranged between 1.3 to 9.1 cms (98.64% of the benign lesions were less than 6 cms). Malignant lesions ranged between 2 to 10.7cms (41% measured 6 to 10 cms in its greatest diameter). Ashwin et al, in his study reported that among 90 patients studied size of the breast lump ranged from 2 to 12cms, the range for benign and malignant lumps was almost similar to our study. The upper and outer quadrant was the commonest site of the lump in our patients (27 study subjects, of which 18 study subjects were malignant), followed by central quadrant (26 study subjects of which 14 subjects were malignant) while the upper inner quadrant was involved in 11 subjects, the lower and outer in 10 study subjects and the lower and inner quadrant in 23 subjects. In the study done by Alema et al, out of total 85 cases 49 cases had lump in Upper outer quadrant and out of them 6 cases (12.2%) were malignant. In this study malignancy was not found in other quadrants of breast. Hussain et al⁷¹, in their series, had 29 cases (58%) with a lump in the upper and outer quadrant and 9 had a lump in the upper and inner quadrant while 4 patients had a palpable lump in the lower and outer quadrants of the breast. In our study subjects, the duration of the lump varied from few months to few years. The mean duration of symptoms for benign lesions was 26.34 months, ranging from 6-60 months (SD 9.62 months) and for the malignant lesions was 6.37 months, ranging from 4 -8 months (SD 1.66 months). In comparison, the study by Hussain al, showed the duration of the lumps in a range between 1 month to 2 years with a majority of patients having a history of between 6 months and 1 year.

The commonest pathology found in our study was fibroadenoma in 41 study subjects. This was followed by fibrocystic disease in 10 patients, fatty degeneration in 2 patients, serous cystadenoma in 1 patient and malignancy in 32 patients. Fibroadenoma exhibits a smear pattern composed of large sheets and cluster of epithelial cells in the honeycomb pattern with some degree of nuclear atypia. The key to the diagnosis of fibroadenoma of the breast is the detachment of oval naked nuclei from the cell clusters and sheets. The fibroadenoma has been considered as a significant cause for the false positive diagnosis. The overall activity of the epithelial cells in this tumour is probably the reason. We had no cases of false positive reports in our

study. Fibrocystic disease includes chronic cystic mastitis, mammary dysplasia and mazoplasia. We had eleven cases of fibrocystic disease, which was reported as benign on fine needle aspiration cytology. Two cases were reported as fatty degeneration in our study. Fatty degeneration and necrosis may follow an episode of trauma to the breast tissue but frequently there is no such history. Histologically the breast lesion is composed of lipid laden macrophages, scar tissue and chronic inflammatory cells. This is not a lesion of the epithelial tissue and has no malignant potential, but can mimic carcinoma by producing a lump, a density lesion on mammography that can calcify and surrounding distortion of the normal breast architecture. Serous cystadenoma of the breast was the other benign diagnosis reported in one study subject in our study. Out of 90 study subjects, we had 36 malignant lesions, infiltrating ductal carcinoma being the most common malignant lesion that presented for needle aspiration. It forms the 88.8% of the malignant lesions aspirated for cytology (32 out of total 36 malignant cases). Although its incidence peaks in the post-menopausal women, it is seen as early as in the second decade of life. For cytology it appears as much cellular smear, often with necrotic background composed of monomorphic cell population with variable cell pattern including conspicuous loss of cellular cohesion, numerous isolated single cells and variable degree of anisonucleosis. In the study done on 91 study subjects by Tiwari et al, also reported fibroadenoma as the commonest pathology (39.6%). Other important conditions such as subareolar abscess, invasive ductal cancer, breast abscess, fibrocystic disease, duct ectasia, and galactocoele ranged from 5.5% to 7.7%. Invasive ductal carcinoma accounts for only 6.6% of the total 91 cases. Khemka et al. in their study, the commonest pathology found was fibroadenoma in 29 cases followed by fibrocystic disease in 4 cases and malignancy in 13 cases. Sumaira Zareef et al, and Ashwin et al, also found the fibroadenomas the commonest lesion of breast in their study.

This study documented the fact that the benign lesions are the most common lesions of the breast. This increased case of benign lesions indicates increase in awareness of the patients. In such lesions the reassurance is the main line of treatment though close follow up is usually mandatory. Size of the needle used for fine needle aspirational cytology has often been a point for discussion since patient comfort and patient friendliness is an important aspect of fine needle aspiration cytology as a superior diagnostic procedure. Disadvantages of a finer needle were an inadequate aspirate; while disadvantages of a thicker needle included pain and hematoma formation. All our patients underwent fine needle aspiration cytology using a no. 23 needle with no patient discomfort and none of the patients complained of any untoward side effects. Walker et

al. compared the use of 21G and 23G needles for fine needle aspiration cytology in breast lumps; 125 patients were included; 61 and 64 patients underwent fine needle aspiration cytology with a 21G and 23G needle, respectively. A chi squared test had showed no statistical difference in the results whichever needle was used in their study. As mentioned above, the main aim of our study was to determine diagnostic correlation between fine needle aspiration cytology and the final histopathology of the lump. In other words, how accurate and reliable was fine needle aspiration cytology in diagnosing breast pathology which could help us in proceeding towards definitive excisional (and often mutilating) surgery without having an unpleasant surprise at the final histopathology report of the specimen. Analysis of the cytological reports in various series confirms the very high diagnostic accuracy of fine needle aspiration cytology. 12 months prospective study of fine needle aspiration cytology of clinically palpable breast lump with histopathological correlation was carried out in our hospital. In that fine needle aspiration cytology revealed benign in 54 patients, suspicious in 2 and malignant in 32 patients with false negative results of 4 and false positive zero. The diagnostic accuracy of fine needle aspiration for benign lesions was 100% and malignant lesions were 93.1% with false negative rate of 0% and false positive rate of 88.9%. The overall sensitivity of fine needle aspiration cytology in diagnosing the palpable breast lump in our study was sensitivity 100%, specificity was 93.1%, positive predictive of 88.9% and negative predictive value of 100%. To give a wider spectrum to our interpretation of the results, we calculated the specificity of fine needle aspiration cytology as a diagnostic test for the malignant lesions, i.e. how specific is fine needle aspiration cytology as test in the diagnosis of malignancy in a breast lump. The positive predictive value of a test indicates the probability of a patient with a positive result to have the disease. Hence, it shows the diagnostic power of the test; while the negative predictive value of a test on the other hand indicates the probability of a patient with negative result not to have the disease.

As already discussed above, the positive and negative predictive value of a test is the ones which measure the performance of a test by measuring its "predictive value" which reflects a diagnostic power of the test. They depend upon the sensitivity, specificity and the disease prevalence. In this regard, Franco et al., in his study of 300 patients on the utility of FNAC, reported a positive predictive value of 100% and a negative predictive value of 92%. A very large study of 1,297 patients done by Choi et al, on correlation of fine needle aspiration cytology and histopathology reports, found the positive predictive value to be 98.4% and a negative predictive value of 88%. In this context, the

following table showing the values obtained in several similar studies is relevant. The accuracy of the needle tip in localizing the breast lump in fine needle aspiration cytology was also studied in our series by comparing the normal glandular cell aspirate with the tumour cell aspirate. The unsatisfactory (inadequate) sampling in which there was little or no cellular material reported, we believe to be an error in the technique of aspiration. In our study we had only two aspirations in which it was reported as unsatisfactory, bringing the inadequate sampling rate to 2.22%. The unsatisfactory specimen rate for benign lesion was 3.33%, whereas for malignant lesion was 0%. The proportion of inadequate sampling as reported by different studies varies from 9 to 18%.

Conclusion

The fine needle aspiration cytology is an important diagnostic tool in the management of a patient with breast lump. It is a patient friendly, easy, reliable, repeatable and simple diagnostic test. When performed by expert hands, the diagnostic accuracy of FNAC is very high. A high sensitivity and a high positive predictive value proved that positive fine needle aspiration cytology in the breast means a definite diagnosis of the concerned pathology if compared with the final histology report.

The high specificity and a high negative predictive value for malignancy illustrated the high accuracy of fine needle aspiration cytology in the diagnosis of breast carcinoma. It can be advised that the patients in which fine needle aspiration cytology is unequivocally diagnostic for breast carcinoma can be managed directly by mastectomy or any other definitive therapy. Since the accuracy of the needle tip in localizing the lump was very high the diagnostic accuracy of fine needle aspiration cytology can be increased by performing repeat aspiration on the lump for which previously being reported as inadequate or unsatisfactory sampling before advising for open biopsy. Thus, we conclude that fine needle aspiration cytology is a very important preliminary diagnostic test in palpable breast lumps, and if done by expert hands, the results show a higher degree of correlation with the final histopathology report.

References

1. Koss LG, Melamed MR. Koss' Diagnostic Cytology and Its Histopathologic Bases, 5th edition, Philadelphia: JB Lippincott Company, 2006: 2-6(a); 9-11(b).
2. Das DK. Fine needle aspiration cytology: Its origin, development, and present status with special reference to a developing country, India. *Diagn Cytopathol* 2003 Jun; 28 (6): 345-51.
3. Orell SR, Sterret GF, Whitaker D. *Fine Needle Aspiration Cytology*, 4th edition, Churchill

- Livingston: Elsevier, 2005: 2(a); 165-166(b); 176-201(c).
4. Patra AK, Mallik RN and Dash S. Fine Needle Aspiration as a Primary Diagnostic Procedure of Breast Lumps. *Indian J Pathol Microbiol* 1991; 34 (4): 259-264.
 5. Park IA and Ham EK. Fine Needle Aspiration Cytology of Palpable Breast Lesions. *Acta Cytol* 1997; 41 (4): 1131-1138.
 6. Rocha PD, Nadkarni NS, Menezes S. Fine needle aspiration biopsy of breast lesions and histopathologic correlation. *Acta Cytol* 1997; 41(3): 705-712.
 7. Qin Z, Shigui N, Yuhua C and Limei Z. Fine Needle Aspiration Cytology of Breast Lesions: Analysis of 323 Cases. *The Chinese-German Journal of Clinical oncology* 2004; 3(3): 172-174.